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ABSTRACT

The purpose of this study was to determine if there were differences between learning disabled and nonlearning disabled students in skill areas and total scores on the Brigance K & 1 Screen for Kindergarten and First Grade. The study investigated whether students with learning disabilities would show significant weaknesses in language-based skill areas and whether their total skill area scores would be significantly lower than the other students. Results indicated that the students with learning disabilities did have significantly lower total scores, but there were no specific weaknesses in language-based skill areas. The need for early intervention in children with learning disabilities and the definition of learning disabilities are discussed. The problems with early identification of learning disabilities are noted, including the fact that preschool and early elementary-aged children have not had much experience in academic skills, and some tests designed for young children are not good predictors of future achievement and ability. The capability of language tests to accurately assess pre-academic abilities in younger children is highlighted. A review of studies on language ability is presented. Appendices include a review board approval letter, parental consent forms, and the data collection form. (Contains 26 references.) (CR)

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Abstract

Early Indicators of Learning Disabilities Using The Brigance K & 1 Screen for Kindergarten and First Grade

Ann Trout

The purpose of this study was to determine if there were differences between learning disabled and nonlearning disabled students in skill areas and total scores on The Brigance K & 1 Screen for Kindergarten and First Grade. Using discriminant function analysis, analysis of variance (ANOVA), and multiple regression procedures, this study compared the percentage of correct items in each skill area of the Brigance among 32 previously identified elementary learning disabled students to determine any patterns of weakness. Total and subtest scores on the same test were compared for 32 nonlearning disabled students matched on age, grade, sex, race, and socioeconomic status to the learning disabled group. It was hypothesized that the learning disabled students would show significant weaknesses in language-based skill areas and their total and skill area scores would be significantly lower than for nonlearning disabled students. The results showed that the learning disabled population did have significantly lower total scores on the Brigance, but there were no specific weaknesses in language-based skill areas. Future

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applications are suggested regarding the significance of this study.

Early Indicators of Learning Disabilities Using The Brigance K & 1 Screen for Kindergarten and First Grade

Ann Trout

A thesis presented to the
Graduate Faculty of Middle Tennessee State University
in partial fulfillment of the requirements
for the degree Master of Arts

May 1995

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Chapter 1

Introduction

Early identification of learning disabilities is an important issue in education today. In 1978, the Report of the President's Commission on Mental Health stated that the need for early detection of learning disabilities was supported by empirical data (Bryant, 1978). Many professionals believe the earlier a disability can be identified, the earlier interventions may begin. With earlier interventions, the impact of the disability on the child is not as severe (Badian, 1982). Additionally, Strag (1972) conducted a survey and found that if dyslexia, a reading learning disability, was diagnosed as early as second grade and proper remediation was provided, a child had about an 82% chance of bringing classroom work up to normal levels. A dyslexic child's chances of successful remediation decreases dramatically as the child gets older. Strag's study showed, in Grades 5 through 7, the percentage of successful remediation was reduced to approximately 10% to 15%.

The definition of learning disabilities that is in current use has been put forth in The Individuals with Disabilities Education Act (1977), and it states:

> "Specific learning disability" means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or

> written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage. (p. 65083)

A student who is eligible to receive special education services under the handicapping condition of "learning disabled" must have a significant discrepancy between ability and achievement. The decision is made at the state level as to the definition of a significant discrepancy. In Tennessee, a significant discrepancy requires more than one standard deviation difference between scores in cognitive and academic areas (Tennessee State Department of Education, 1993). In most states, ability is measured using an individually administered intelligence test of which the global measure of ability is considered to be the most valid. Achievement is measured by an individually administered test in which skills, such as reading, mathematics, and written language, are assessed.

There are several problems associated with early identification. Preschool and early elementary-aged children have not had a great deal of experience in academic skills. These students must demonstrate a certain level of academic skills in order to show the discrepancy needed to determine a learning disability in a specific academic area,

as required by state and federal laws. Another problem is that some tests designed for young children are not considered to be good predictors of future achievement and ability. The achievement tests created for preschoolers have very few items designed to assess academic achievement; this means their achievement skills are not being assessed thoroughly or accurately.

A significant discrepancy in the areas of listening comprehension and oral expression can also determine a learning disability (Tennessee State Department of Education, 1993). These are typically thought of as receptive and expressive language skills.

Tests that do a good job of assessing pre-academic abilities in younger children are language tests which measure both receptive and expressive language capabilities. Some of these tests are able to assess children as young as 2 years old. McCarthy (1989) feels that, in order to identify a preschool child with a specific learning disability using the discrepancy component, the assessment battery should include measures that assess the child's attainment of developmental milestones and measures that could determine if that child had a disorder in the basic processes required to understand or use language. Therefore, language tests are believed to be an important component in the assessment of a preschool child due to the fact that many learning disabilities are the result of

language deficiencies early in life (Wiig, Lapointe, & Semel, 1977). Wiig and Semel (1973) and Wiig, Semel, and Crouse (1973) found differences and developmental delays in the language systems of learning disabled children as compared with nonlearning disabled children on a variety of language tasks using language tests that assess the many facets of language skills, such as morphology, auditory perception, and receptive and expressive language skills.

In a study done by McLeod (1982), language tests were part of a battery of tests administered to kindergarten students in an attempt to predict underachievement in later school years. These students were given an intelligence test, Raven's Coloured Matrices, and several standardized measures of language functioning at the beginning of their kindergarten year. At the end of this same year, they were given several more measures of language ability. A method for determining cutoff scores to identify underachievers using the intelligence test and the Raven's Coloured Matrices as predictors was used. In McLeod's study of these kindergartners, 11 of 19 were found to be both underachievers academically and language deficient, and 7 were language deficient, but not identified as underachievers. As McLeod follows these children in their later school years, it is believed the language deficient kindergartners will experience academic difficulties.

Again, language testing appears to be a valid instrument in the identification of learning problems.

It is believed that learning disabilities are language-based, especially those involving learning problems in reading. In a paper written by Sawyer and Butler (1991), the authors propose that there are five prerequisite language roots of reading competence. These five areas are phonology, semantics, syntax, auditory segmenting, and short- and long-term memory. The authors state that a child who enters school lacking in these areas is missing important building blocks needed for learning to read. According to Newcomer and Magee (1977), they have found that a great number of children who have reading deficits also have deficits in at least one oral language skill. This skill could be either semantics or syntax. They go on to conclude that, when oral language deficits are identified in younger children, this could predict students who may experience learning difficulties.

In a study done by Catts (1991), language-impaired kindergartners were followed into first grade and administered the Woodcock Reading Mastery Tests-Revised to determine the types of language impairments that were directly associated with developmental dyslexia. A control group was also used which showed that young children who entered school with language deficits were at a higher risk for reading difficulties than those without language

deficits. He found that language impairments, especially the semantic-syntactic type, in kindergarten students could serve as early indicators of dyslexia. As can be determined from the studies mentioned above, there is consistent support for language difficulties early in school life being indicators for reading problems later.

Roth, McCaul, and Barnes (1993) studied a battery of tests regularly administered to kindergarten students in Maine to determine if it contained any predictive value. The battery contained an adaptation of the Goodenough Draw-A-Person, the Motor Activity Scale, the Preschool Language Scale, the Peabody Picture Vocabulary Test-Revised, and the Developmental Test of Visual-Motor Integration. The researchers concluded that students who had difficulties in school later on had significantly lower scores overall. Also, Glazzard (1977) investigated three different instruments that could be used to predict first-grade achievement. She discovered a teaching rating scale was the best tool because it aided the teacher in recognizing those characteristics of his/her students who may develop learning difficulties later in school.

In the current study, a method for using a kindergarten screening instrument to indicate the need for further testing for language deficits and learning disabilities was explored. One area studied was a comparison of total scores between the learning disabled population and the nonlearning

disabled students. It was hypothesized that the learning disabled population would have lower total scores on The Brigance K & 1 Screen for Kindergarten and First Grade (Brigance, 1987). It was also hypothesized that learning disabled children would have lower scores on the Brigance subtests containing an important language component. The results should indicate these weaknesses in the skill areas of Color Recognition, Picture Vocabulary, Identification of Body Parts, Follows Verbal Directions, and Syntax and Fluency. Another focus of the study was the patterns of scores within the learning disabled population involving the subtests on the Brigance.

Chapter 2

Methods

Subjects

The subjects were 64 elementary-aged students in first through sixth grades. The mean grade of the students was 3.8, with a standard deviation of 1.4. They ranged in age from 6 to 12 years; the mean age in months was 118.84, with a standard deviation of 19.1 (see Table 1). The students all attended the same elementary school in a suburban public school system in a southern state for all or part of their instruction up to the time of this study. Thirty-two of these students were previously identified as learning disabled in either reading or written language according to the criteria established by the Tennessee State Department of Education (1993). Thirty-two additional nonlearning disabled students were matched with these learning disabled students using class rolls obtained from the school. The learning disabled students were matched to nonlearning disabled peers based on the grade they were attending and their age, race, gender, and socioeconomic status. Socioeconomic status was based on participation in the Federal Free and Reduced Price Lunch Program.

Materials

The materials consisted of information contained in each child's school records. There were data from the

Table 1

Student Characteristics

	n	% of sample
Grade		
1	4	6
2	10	16
3	12	19
4	16	25
5	14	22
6	8	13
Age in months		
77- 84	4	6
85-108	16	25
109-132	29	45
133-156	15	23
Sex		
Male	44	69
Female	20	31
Race		
African American	18	28
Caucasian	46	72
Socioeconomic status		
Middle to low	14	22
Middle to high	50	78

Note. Students were evenly matched; therefore, n is divided between the control group and the experimental group, except for age = 109-156 months.

record form of a Brigance kindergarten screen on every child in the study. In this school system, the Brigance is usually administered prior to or upon arrival into a kindergarten program. The Brigance is an individually administered, criterion-referenced screening assessment of a student's development in skill areas which are believed to be necessary for success in kindergarten. On the first subtest, Personal Data Response, the child is asked to verbally give the examiner his/her first name and full name, age, address, and birth date. On the Color Recognition subtest, the child is asked to name eight basic colors and pink and gray. The Picture Vocabulary subtest consists of 10 pictures of familiar things (e.g., dog, cat, leaf, car, etc.) which the child is asked to name correctly.

In the Visual Discrimination subtest, the child must discriminate which of four symbols is different in 10 items. The symbols that are different begin with shapes and progress into letters. The child copies a circle, a minus sign, a plus sign, a square, and a triangle onto paper in the Visual-Motor Skills subtest. Gross motor skills are evaluated by asking the child to perform tasks, such as hopping, standing on one foot, and walking forward and backward with specific difficult restraints added. In the next subtest, Rote Counting, the child is asked if he/she can count to 10. Next, in the Identification of Body Parts subtest, the child is asked to identify 10 different body

parts (e.g., chin, heel, jaw, wrist, etc.) by pointing or touching them when asked. The Follows Verbal Directions subtest consists of asking the child to listen, remember, and follow a one- and two-step direction. The Numeral Comprehension subtest involves matching quantities with the numerals 1-5 in a mixed-up order. Next the child is asked to print his/her first name and to determine if there are any reversals of letters in the Prints Personal Data subtest. Finally, the examiner determines whether the student's speech is understandable and whether or not the child speaks in complete sentences in the Syntax and Fluency subtest.

The Brigance can be administered in about 10 to 20 minutes, covers 12 subtests, and yields a possible total score of 100. A test review done by Helfeldt (1984) stated that the Brigance has been widely field-tested and that the content of the subtests is similar to other well-established tests. He further stated that it has adequate descriptive validity and reliability.

In the case of learning disabled students, their special education records were also reviewed, and standard scores from an individually administered achievement test were recorded, along with standard scores from a measure of intellectual ability. In most cases, the measure of intellectual ability was the Wechsler Intelligence Scale for Children-III (WISC-III; Wechsler, 1991). The WISC-III is a

measure of intelligence that covers an age range from 6-0 to 16-11 years and contains 13 subtests. Five of the tests form the Verbal scale, and five more form the Performance scale. The other three subtests are supplementary subtests, one associated with the Verbal scale and the other two associated with the Performance scale. In a few of the cases, the Kaufman Assessment Battery for Children (Kaufman & Kaufman, 1983), another measure of intellectual ability, was used instead of the WISC-III.

In most cases, the achievement measure used was the Woodcock-Johnson Psychoeducational Battery-Revised (WJ-R; Woodcock & Johnson, 1989). The WJ-R is a comprehensive, individually administered set of 27 tests that assesses three areas of functioning: cognitive ability, achievement, and interest. The learning disabled students were only administered the standard battery of the Tests of Achievement. These consist of nine subtests that measure basic reading skills, reading comprehension, math calculation, math reasoning, written language skills, and knowledge in science, social studies, and humanities. In a very few of the cases, the Wechsler Individual Achievement Test (Wechsler, 1992), a different achievement test, was used instead of the WJ-R.

Procedure

The supervisor of special education and the principal of the elementary school were contacted and gave verbal

permission for the study to be conducted. Written approval for the study was also granted by the Middle Tennessee State University Institutional Review Board (see Appendix A). After approval, parents of learning disabled students were sent a letter explaining the study and requesting permission to review both their children's special education records and cumulative files (see Appendix B). There were 54 permission forms sent out, and 44 of those were returned (81%). Permission was granted by 41 parents, and 3 parents denied permission. Of the 41 who granted permission, only 32 were used due to the fact that the other students had not been administered a Brigance upon beginning kindergarten. Data sheets were filled out on each child using an identification number to maintain anonymity (see Appendix C). The scores from the Brigance, the individual achievement test, and the intelligence tests were recorded, along with their age in months, grade, gender, race, and participation in the Federal Free and Reduced Price Lunch Program.

The next step matched each learning disabled student with a nonlearning disabled counterpart in the school. Class rolls were obtained, and at least two or three suitable nonlearning disabled matches were found for each learning disabled student. Parental permission forms were sent out requesting permission to review these children's records for the Brigance (see Appendix D). Of the 110 forms

sent to this group, 73 were returned (66%). Permission was granted by 69 parents, and 4 parents denied permission. Of the 69 forms granting permission, only 32 were needed to match the learning disabled students. Data sheets were also filled out on these students containing all their Brigance scores and demographic data.

Chapter 3

Results

The SPSS/PC+ 4.0 (Norusis, 1990) computer program was used. Percentages for the Brigance subtests and total scores, and standard scores for the other measures were analyzed. The level of significance used in all analyses was .05.

A discriminant function analysis was used to predict learning disabled versus nonlearning disabled group membership from Brigance subtests and total score. A one-way analysis of variance was used to determine if there was a significant difference between the two groups in each skill area and the total score obtained on the Brigance. Within the learning disabled group, scores from the Brigance subtests and intelligence test results were used to predict performance on the academic tests. Further, a multiple analysis of variance (MANOVA) was used to study differences in scores on Brigance subtests in learning disabled children according to the area(s) in which their learning disabilities had been identified: reading, written language, or both reading and written language.

For an initial analysis of the data, correlations were performed using the variables of age, grade, sex, race, socioeconomic status, and the subtests of the Brigance kindergarten screen (Personal Data Response, Color

Recognition, Picture Vocabulary, Visual Discrimination, Visual-Motor Skills, Gross Motor Skills, Rote Counting, Identification of Body Parts, Follows Verbal Directions, Numeral Comprehension, Prints Personal Data, and Syntax and Fluency) and the total score from the Brigance (see Table 2).

The correlation analysis revealed a significant relationship existing between the student's sex and the Brigance Syntax and Fluency subtest, r = -.237, p = .030. This suggests males were perceived to have more understandable speech and more often spoke in complete sentences as compared to females. Half of the Brigance subtests were significantly correlated with race. Color Recognition, r = .320, p = .005; Visual Discrimination, r = .483, p = .000; Visual-Motor Skills, r = .454, p = .000; Rote Counting, r = .258, p = .020; Follows Verbal Directions, r = .355, p = .002; Numeral Comprehension, r = .374, p = .001; Prints Personal Data, r = .387, p = .001; and the total score, r = .487, p = .000, were the subtests on which Caucasian children had higher scores than African American children. Also, socioeconomic status correlated significantly with three subtests: Follows Verbal Directions, r = .240, p = .028; Numeral Comprehension, r = .252, p = .022; Prints Personal Data, r = .336, p = .003; and the total score, r = .242, p = .027. These correlations indicate that students from middle to high socioeconomic

Table 2

Intercorrelations Among the Variables

	Grade	Age	Sex	Race	SES	PDR	CR	PV	VD	VMS	GMS	RC	IBP	FVD	NC	PPD	S&F	TS
Grade	____																	
Age	.937	____																
Sex	.245	.285	____															
Race	.050	.125	-.178	____														
SES	-.028	-.002	-.133	.510	____													
PDR	.172	.138	.069	.194	.134	____												
CR	.126	.093	.185	.320**	.179	.563	____											
PV	-.138	-.104	.087	.032	.076	.070	.390	____										
VD	.171	.189	.078	.483***	.151	.303	.515	.327	____									
VMS	.204	.186	-.093	.454***	.138	.295	.351	.335	.697	____								
GMS	-.050	-.029	-.028	.039	-.101	.231	.231	.247	.228	.318	____							
RC	.144	.163	-.056	.258*	.187	.301	.318	.189	.431	.391	.214	____						
IBP	.282*	.277*	.126	.056	-.077	.485	.420	.192	.247	.292	.164	.331	____					
FVD	-.034	.022	-.010	.355**	.240*	.019	.256	.156	.296	.220	.060	.092	-.063	____				
NC	.067	.088	-.085	.374***	.252*	.377	.510	.293	.665	.585	.193	.510	.157	.159	____			
PPD	.163	.148	-.110	.387***	.336**	.398	.360	.201	.545	.567	.254	.439	.418	.088	.506	____		
S&F	-.097	-.205	-.237*	.177	.139	.089	.124	.039	.218	.404	.278	.081	-.089	.124	.264	.056	____	
TS	.162	.152	-.022	.487***	.242*	.583	.693	.386	.832	.794	.439	.586	.438	.260	.810	.699	.379	____
M	3.78	118.84	1.31	1.72	1.78	75.00	85.63	99.06	78.13	69.06	87.66	90.00	66.56	97.19	73.75	53.13	94.53	81.72
SD	1.44	19.08	.47	.45	.42	19.84	25.32	3.44	33.80	29.59	16.11	24.43	23.92	12.78	38.19	50.30	20.15	16.10

Note. Sex: M = 1; F = 2; Race: African American = 1; White = 2; SES: middle to low = 1; middle to high = 2. PDR = Personal Data Response; CR = Color Recognition; PV = Picture Vocabulary; VD = Visual Discrimination; VMS = Visual-Motor Skills; GMS = Gross Motor Skills; RC = Rote Counting; IBP = Identification of Body Parts; FVD = Follows Verbal Directions; NC = Numeral Comprehension; PPD = Prints Personal Data; S&F = Syntax and Fluency; TS = total score.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

status families are more likely to do well on the Brigance. Although there were no specific hypotheses as to the effects of sex, race, and socioeconomic status on Brigance scores, the results suggest those factors are significantly related to the Brigance scores.

A direct discriminant function analysis was performed using the 13 Brigance scores as predictors of membership in the learning and nonlearning disabled groups. Predictor variables were Personal Data Response, Color Recognition, Picture Vocabulary, Visual Discrimination, Visual-Motor Skills, Gross Motor Skills, Rote Counting, Identification of Body Parts, Follows Verbal Directions, Numeral Comprehension, Prints Personal Data, Syntax and Fluency, and the total score. The groups were learning disabled and nonlearning disabled students.

Of the 64 cases, evaluation of assumptions of linearity, normality, multicolinearity or singularity, and homogeneity of variance-covariance matrices showed no effect of these factors on the validity of this multivariate analysis. One discriminant function was calculated, resulting in Wilks's lambda = .51, $p < .001$ (See Table 3). The discriminant function accounted for 100% of the between-group variability. The discriminant function maximally separated learning disabled from nonlearning disabled

Table 3

Standardized Canonical Discriminant Function Coefficients

Brigance subtest	Function 1
Personal Data Response	1.42
Color Recognition	.60
Picture Vocabulary	.64
Visual Discrimination	1.95
Visual-Motor Skills	.97
Gross Motor Skills	1.19
Rote Counting	.71
Identification of Body Parts	.69
Follows Verbal Directions	.12
Numeral Comprehension	2.67
Prints Personal Data	1.61
Syntax and Fluency	1.19
Total score	-7.96

students using the formula, D_1 = 1.42PDR + .60CR + .64PV + 1.95VD + .97VMS + 1.19GMS + .71RC + .69IBP + .12FVD + 2.67NC = 1.61PPD + 1.19S&F - 7.96TS.

A matrix of correlations between predictor variables and the discriminant function suggested that the primary variable in distinguishing between learning disabled and nonlearning disabled students was Numeral Comprehension. An analysis of variance (ANOVA) was used to study the group differences of the predictors to the discriminant function analysis. Learning disabled students scored lower on Numeral Comprehension (M = 55.63) than nonlearning disabled students (M = 91.88). Also contributing significantly to discrimination between these two groups were Visual Discrimination, Prints Personal Data, Personal Data Response, and Syntax and Fluency (see Table 4). Again, the learning disabled students scored lower on these subtests than did the nonlearning disabled students. For the 100% of the cases from whom the function was derived, there was an 81.3% correct classification rate. This indicates a high degree of consistency in the classification scheme (see Table 5).

Hypothesis 1 predicted that the learning disabled population would have lower total scores on the Brigance. Analyses of variance showed a significant main effect for group with an F value of 12.03, p = .001. The comparison of cell means indicated that Brigance scores in the nonlearning

Table 4

Cell Means for ANOVAs with Learning Disabled and Nonlearning Disabled Groups

Brigance subtest	LD	Non-LD
Personal Data Response	70.00	80.00
Picture Vocabulary	98.13	100.00
Visual Discrimination	69.06	87.19
Visual-Motor Skills	60.63	77.50
Rote Counting	82.50	97.50
Numeral Comprehension	55.63	91.88
Prints Personal Data	31.25	75.00
Total score	75.28	88.16

Note. LD = learning disabled; Non-LD = nonlearning disabled.

Table 5

Accuracy of Classification

Actual groups	Number of cases	Predicted Group membership: LD	Predicted Group membership: Non-LD
Learning disabled	32	24 75.0%	8 25.0%
Nonlearning disabled	32	4 12.5%	28 87.5%

Note. Percent of "grouped" cases correctly classified: 81.25%. LD = learning disabled; Non-LD = nonlearning disabled.

disabled population ($\underline{M}$ = 88.2) were significantly higher than in the learning disabled group ($\underline{M}$ = 75.3), thus supporting Hypothesis 1.

Hypothesis 2 predicted that learning disabled children would have lower scores on the following Brigance subtests: Color Recognition, Picture Vocabulary, Identification of Body Parts, Follows Verbal Directions, and Syntax and Fluency which contain language components. Although the Brigance discriminated significantly between the groups on more than half of the subtests, these specific subtests mentioned were not significantly different between the groups (see Table 6). Hypothesis 2 was not supported except for the Picture Vocabulary subtest, and in this particular case ceiling effects limited the variance.

In exploring the patterns of scores within the learning disabled population, it was found that specific Brigance scores predicted later performance on individual achievement subtests (see Table 7). Using stepwise multiple regression analysis, the combination of the Brigance total score and the subtest of Gross Motor Skills was measured to be the best set of predictors for the WJ-R subtests, Basic Reading Skills and Reading Comprehension. The set of predictors accounted for a total of 35% of the variance. In the prediction of Broad Reading score, the Color Recognition and the Gross Motor Skills subtests were good predictors and explained 29% of the variance. Accounting for 38% of the

Table 6

Differences in Scores on the Brigance in Learning Disabled and Nonlearning Disabled Groups Using a One-Way ANOVA

	Sum of squares	df	Mean square	F	Sig. of F
Significant variables					
Personal Data Response	1,600.00	1	1,600.00	4.28	.043
Picture Vocabulary	56.25	1	56.25	5.07	.028
Visual Discrimination	5,256.25	1	5,256.25	4.89	.031
Visual-Motor Skills	4,556.25	1	4,556.25	5.58	.021
Rote Counting	3,600.00	1	3,600.00	6.57	.013
Numeral Comprehension	21,025.00	1	21,025.00	18.39	.000
Prints Personal Data	30,625.00	1	30,625.00	14.75	.000
Total score	2,652.25	1	2,652.25	12.03	.001
Nonsignificant variables					
Color Recognition	625.00	1	625.00	.98	.327
Gross Motor Skills	976.56	1	976.56	3.94	.052
Identification of Body Parts	1,056.25	1	1,056.25	1.87	.176
Follows Verbal Directions	56.25	1	56.25	.34	.562
Syntax and Fluency	351.56	1	351.56	.86	.356

Table 7

Regression Analyses for the Prediction of Performance on Subtests of an Individual Achievement Test

	R^2	Beta	T
Basic Reading Skills	.352		
Total score		.526	3.335
Gross Motor Skills		-.444	-2.819
Reading Comprehension	.318		
Total score		.544	3.268
Gross Motor Skills		-.383	-2.299
Math Calculation	.381		
Total score		.634	3.915
Follows Verbal Directions		-.397	-2.452
Math Reasoning	.480		
Prints Personal Data		.480	3.431
Gross Motor Skills		-.387	-2.739
Syntax and Fluency		.385	2.729
Dictation	.639		
Rote Counting		.592	4.849
Color Recognition		.442	3.620
Writing Samples	.412		
Follows Verbal Directions		.470	3.044
Color Recognition		.382	2.474
Reading total	.294		
Color Recognition		.500	3.055
Gross Motor Skills		-.361	-2.204
Math total	.512		
Prints Personal Data		.512	3.785
Syntax and Fluency		.455	3.369
Gross Motor Skills		-.288	-2.117
Written Language total	.283		
Total score		.532	3.323

variance, the combination of the total score and the Follows Verbal Directions subtest was measured to be the best set of predictors of math calculation. For both Math Reasoning and Broad Mathematics scores, the subtests of Prints Personal Data, Syntax and Fluency, and Gross Motor Skills interpreted 48% and 51% of the variance, respectively. Both Brigance subtests, Rote Counting and Color Recognition, predicted scores on the Dictation subtest with 64% accuracy. When predicting the scores on the Writing Samples subtest, the Brigance subtests, Follows Verbal Directions and Color Recognition, were good predictors, accounting for 41% of the variance. The only predictor from the Brigance for the Broad Written Language score was the total score from the Brigance, and it explains 28% of the variance.

It is interesting to note that the Brigance subtest, Gross Motor Skills, was a predictor in all three reading scores and two of the math scores. This was not an expected result. Also, the Brigance total score helped predict two reading scores, a math score, and a written language score. For the two written language subtests and the Broad Reading score from the WJ-R, the predictor, Color Recognition, from the Brigance was the most important.

Finally, a MANOVA was performed to determine whether there were differences in Brigance subtest scores within the learning disabled population according to the area(s) in which the learning disabilities were identified: reading,

written language, or both reading and written language. There were no significant differences in Brigance scores when comparisons were made between children who were identified as learning disabled in reading or those not identified as learning disabled in reading, or those children identified as learning disabled in written language or those not identified as learning disabled in written language. All values were nonsignificant. Brigance subtest scores did not predict the type of learning disability later diagnosed.

Chapter 4

Discussion

The finding which indicates that groups of students can be correctly identified as learning disabled or not learning disabled approximately 81% of the time by using scores from the Brigance is important because it indicates that, even at the beginning of kindergarten, there are indicators of possible academic problems later in school life. Also, the discriminant function analysis identified specific variables that were important in discriminating between the two groups: Numeral Comprehension, Visual Discrimination, Prints Personal Data, Personal Data Response, and Syntax and Fluency. When comparing the five most important variables in the discriminant function analysis with the result of the ANOVA, the first four variables were also significant variables identified by the ANOVA. This indicates these subtest scores would be the most important ones to use to discriminate between learning disabled and nonlearning disabled students.

Hypothesis 2 predicted that the two groups would have significantly different scores in Color Recognition, Picture Vocabulary, Identification of Body Parts, Follows Verbal Directions, and Syntax and Fluency due to the fact these subtests are related more to language skills taught to children of this age rather than the skills tested by other

subtests on the Brigance. When comparing the predicted subtests with the previously mentioned significant variables within the ANOVA, only one matched, and that one was questionable due to ceiling effects and limited variance. Smith (1994) suggests some of the best pre-academic predictors of learning disabilities involve naming common colors and objects, following directions, demonstrating vocabulary comprehension, writing one's name, copying designs, visual discrimination, number knowledge, and numeral recognition. Both the hypothesized variables and the significant variables fall within these skills. A possible explanation for why the subtests hypothesized to be significantly different between the two groups were not different could be that all of these individual skills used as a group are better predictors than using only a few of these skills as predictors. Also, it is possible the subtests on the Brigance thought to be testing language concepts are not actually testing the same things as actual language tests.

Hypothesis 1 predicted the learning disabled students would have lower total scores on the Brigance. The ANOVA indicated this hypothesis was true for this sample. This means a screening test widely used prior to kindergarten entry could be used as one of several instruments to detect indicators of learning disabilities in very young elementary students.

Another finding is some subtest scores from the Brigance can be used to help predict later performance on individual achievement subtests within the learning disabled population. Lowell (1971) found that, of the many factors in reading readiness tests, the skill of being able to name the letters of the alphabet best reflects a readiness for learning to read. Bradley and Bryant (1983) discovered the skill of being able to rhyme words could have an impact on a child's ability to learn to read and write. In the current study, Gross Motor Skills may be a good predictor of both reading and math achievement within the learning disabled students, and Color Recognition is able to help predict scores in written language and reading achievement. Bruininks and Bruininks (1977) found performance on measures of both gross and fine motor skills in the learning disabled population was significantly lower than in the nonlearning disabled population. This could indicate that not only do gross motor skills help differentiate between learning disabled and nonlearning disabled students, but within those patterns of deficits lie indicators of performance in reading and math skills.

Even though there is a great deal of information to be gained from analyzing patterns of scores on the Brigance, there are some questions it cannot answer. It was discovered it was not possible to use Brigance scores to

determine the type of learning disability that will occur in a child later identified as learning disabled.

The current study examined a widely used screening instrument, The Brigance K & 1 Screen for Kindergarten and First Grade, which is administered very early in school life, to determine if this tool could be useful as an indicator of academic problems in the future. If so, it could help identify children who could be at-risk for difficulties and promote early identification and intervention for the learning problem. The Brigance can be used to differentiate between learning disabled and nonlearning disabled students by using all the scores together and a discriminant function formula, by analyzing groups of specific subtests or by the value of total score. It was even found these same scores can help predict achievement in later years.

The finding that the Brigance kindergarten screen is significantly correlated with race and to a somewhat lesser extent with socioeconomic status was not hypothesized, but does bear consideration when using this instrument with lower socioeconomic or African American populations. Seven of 12 subtests and the total score were all significantly correlated with these variables, indicating these populations scored lower in these areas. This indicates the Brigance may exhibit questionable reliability (Helfeldt, 1984). However, it was also found that these scores need to

be interpreted cautiously in the populations of African American children and those children who come from lower socioeconomic situations because of systematic variation in the scores according to the child's status on these variables.

Some of the limitations of this study include the size of the sample, the limit of only one school being represented, and the use of a cross-sectional versus longitudinal design. The sample was small and restricted to only one school which limits the generalizability of the results to a larger population in more diverse geographic locations. Also, because only test scores were used as opposed to gathering a broader range of information, such as a family history, a complete and valid viewpoint on the significance of the results may not be represented. A cross-sectional study is not as representative as a longitudinal study, although both designs have their limitations. Further research could utilize larger samples from several schools or school systems across the country that use the Brigance. The data could consist of test scores, family histories, and other informal measures. Now that a cross-sectional study has been completed, possibly a longitudinal study, following an entire class of kindergarten students, could be done to determine if there are any differences in the results of the study.

The results of this study have evidently been unique in several ways. There is very little research investigating the connections between specific preschool and early elementary skills and later achievement in reading, math, and written language. This study needs to be replicated. Future research could focus on this connection and investigate specifically if gross motor skills or color recognition tasks play a role in achievement. Also, the reliability of the Brigance should be investigated further to determine if race and socioeconomic status are problems regarding results from this test. There is very little research regarding the reliability or validity of the Brigance (Helfeldt, 1984). Finally, if further research could be performed analyzing the role that language skills play in early academic skills and how to better identify those skills in early school years, this would help promote earlier identification of academic problems before the child has suffered in more areas than just academic success.

Appendixes

Appendix A

Middle Tennessee State University Institutional Review Board Approval Letter

TO: Jane Brissie and Laura Ann Trout
Department of Psychology

FROM: Belinda Traughber
Chair, MTSU Research Ethics Committee

RE: "Comparisons of LD and Non-LD Elementary Students on the Brigance Kindergarten Screen"
APPROVED THROUGH EXPEDITED REVIEW

DATE: September 3, 1993

The purpose of this memo is to inform you that I have reviewed the materials provided for your proposed research in terms of ethical utilization of human subjects. Since the research involves only the use of existing test data in educational settings and does not identify the subjects, it is exempt from the informed consent requirements of 45 CFR Part 46.

I approve the study through the expedited review procedure authorized in 46.110 of 45 CFR Part 46. Best of luck on the successful completion of your project.

Appendix B

Permission Letter to Parents

of Learning Disabled Children

Dear Parent(s):

My name is Ann Trout, and I am a speech therapist at Northfield Elementary. I am currently working on my Master's Degree at Middle Tennessee State University. A requirement of the Master's Degree is that I must conduct a study and write a thesis.

I would like to ask for your cooperation at this time. This is strictly on a voluntary basis. I am asking for your permission to review your child's special education and cumulative records here at school. This information will be used in a comparative study to determine if areas of need occur on the Kindergarten Brigance Screen. Your child's name will <u>never</u> appear on any material. They will be assigned a number between 1 and 50, and that will be my means of identification for this data. If you have any further questions, please feel free to call me at home (895-6314). I greatly appreciate your help and cooperation!

Thank you,

Ann Trout

_____ I give my permission for you to review my child's records.

_____ _____

Child's Name Parent's Signature

_____ I <u>do not</u> give permission for you to review my child's records.

_____ _____

Child's Name Parent's Signature

Appendix C

Data Sheet

ID number_____ Student's age_____ Grade_____

Sex M or F Race A-A W H A Other Free Lunch Y N

Brigance Skill Areas	Number of Correct Responses	Student's Score
Personal Data Response	_____	/ 10
Color Recognition	_____	/ 10
Picture Vocabulary	_____	/ 10
Visual Discrimination	_____	/ 10
Visual-Motor Skills	_____	/ 10
Gross Motor Skills	_____	/ 10
Rote Counting	_____	/ 5
Identification of Body Parts	_____	/ 5
Follows Verbal Directions	_____	/ 5
Numeral Comprehension	_____	/ 10
Prints Personal Data	_____	/ 5
Syntax and Fluency	_____	/ 10
Total Score	_____	/100

LD ONLY

Last certification date _____

Area(s) of certification for LD and standard scores on an achievement test: WJ-R or WIAT (circle one)

	Standard Scores		Standard Scores
Basic Reading Skills	_____	Reading	_____
Reading Comprehension	_____		_____
Math Computation	_____	Math	_____
Math Reasoning	_____		_____
Dictation	_____	Written Language	_____
Writing Samples	_____		_____

IQ TEST SCORES FULL SCALE _____

VERBAL _____ PERFORMANCE _____

Appendix D

Permission Letter to Parents of

Nonlearning Disabled Children

Dear Parent(s):

My name is Ann Trout, and I am a speech therapist at Northfield Elementary. I am currently working on my Master's Degree at Middle Tennessee State University. A requirement of the Master's Degree is that I must conduct a study and write a thesis.

I would like to ask for your cooperation at this time. This is strictly on a voluntary basis. I am asking for your permission to review your child's cumulative record here at school and record only his/her scores from their Brigance Kindergarten Screen administered at Kindergarten registration. Your child's name will never appear on any material. They will be assigned a number between 1 and 50, and that will be my means of identification for this data. If you have any further questions, please feel free to call me at home (895-6314). I greatly appreciate your help and cooperation!

Thank you,

Ann Trout

_____ I give my permission for you to review my child's records.

_____ _____

Child's Name Parent's Signature

_____ I do not give permission for you to review my child's records.

_____ _____

Child's Name Parent's Signature

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